case the components of the light oppositely polarised in the two sections are unequal, being as cos 22½° to sin 22½°; these components respectively fall 22½° from the plane of reflection of the silver plate and from the perpendicular plane, and are each resolved in the same proportion in these two planes. The weak component of the first, and the strong component of the second, are resolved into the normal plane, while the strong component of the first and the weak component of the second are resolved into the perpendicular plane.

As bearing intimately on the subject of this paper, I will here quote a passage from a memoir presented by Fresnel to the French Academy of Sciences in 1817, and published, in abstract, in the "Annales de Chimie," t. xxviii., 1825:—

"If a thin crystallised plate be placed between two parallelopipeds of glass crossed at right angles, in each of which the light previously polarised undergoes two total reflections at the incidence of 54½°, first before its entrance into the plate (which we suppose perpendicular to the rays), and subsequently after its emergence; and if, besides, the plate be turned so that its axis makes an angle of 45° with the two planes of double reflection, this system will present the optical properties of plates of rock crystal perpendicular to the axis, and of liquids which colour polarised light. When the principal section of the rhomboid with which the emergent light is analysed is turned round, the two images will gradually change colour, instead of experiencing only simple variations in the vividness of their tints, as occurs in the ordinary case of thin crystallised plates; besides, the nature of these colours depends only on the respective inclination of the primitive plane of polarisation and the principal section of the rhomboid, that is to say, of the two extreme planes of polarisation; thus, when this angle remains constant, the system of the crystallised plate and the two parallelopipeds may be turned round the transmitted pencil without changing the colour of the images. It is this analogy between the optical properties of this little apparatus and those of plates of rock-crystal perpendicular to the axis which enabled M. Fresnel to foresee the peculiar characters of double refraction that rock-crystal exerts on rays parallel to the axis."

It does not appear that Fresnel, in any of his published memoirs, has given any further modifications of this experiment, the importance of which has been almost entirely overlooked in elementary treatises on light. He does not seem to have remarked that similar phenomena of successive polarisation are exhibited when the light incident on the crystallised plate is plane polarised, nor that the order of the succession of the colours depends on the position of the principal section with respect to the plane of polarisation. These circumstances are indeed necessarily included in the beautiful theory established by this eminent philosopher; but I am not aware that they have hitherto been specifically deduced or experimentally shown.

The apparatus (Fig. 1) affords also the means of obtaining large surfaces of uncoloured or coloured light in every state of polarisation, rectilinear, elliptical, or circular.

It is for this purpose much more convenient than a Fresnel's rhomb, with which but a very small field of view can be obtained. It must, however, be borne in mind that the circular and elliptical undulations are inverted in the two methods; in the former case they undergo only a single, in the latter case a double reflection.

For the experiments which follow, the crystallised plate must be placed on the diaphragm E between the silver plate and the analyser, instead of as in the preceding experiments, between the polariser and the silver plate.

By means of a moving ring within the graduated circle D the silver plate is caused to turn round the reflected ray, so that while the plane of polarisation of the ray remains always in the plane of reflection of the glass plate, it may assume every azimuthal position with respect to the plane of reflection of the silver plate. The film to be examined and the analyser move consentaneously with the silver plate, while the polarising mirror remains fixed.

In the normal position of the instrument the ray polarised by the mirror is reflected unaltered by the silver plate; but when the ring is turned to 45°, 135°, 225°, or 315°, the plane of polarisation of the ray falls 45° on one side of the plane of reflection of the silver plate, and the ray is resolved into two others polarised respectively in the plane of reflection and the perpendicular plane, one of which is retarded on the other by a quarter of an undulation, and consequently gives rise to a circular ray, which is right-handed or left-handed according to whether the ring is turned 45° and 225°, or 135° and 315°. When the ring is turned so as to place the plane of polarisation in any intermediate position be-tween those producing rectilinear and circular light, elliptical light is obtained on account of the unequal resolution of the ray into its two rectangular components.

Turning the ring of the graduated diaphragm from left to right when the crystallised film is between the silver plate and the analyser, occasions the same succession of colours for the same angular rotation as rotating the analyser from right to left when the instrument is in its normal position, and the film is between the polariser and the silver plate.

To arrange the apparatus for the ordinary experiments of plane-polarised light without the intervention of the silver plate, all that is necessary is to remove the silver plate from the frame F, and to substitute for it a plate of black glass, which must be fixed at the proper polarising-angle.

To convert it into a Norrenberg's polariser, a silver mirror must be laid horizontal at H, and the instrument straightened, as shown at Fig. 3, so that a line perpendicular to the mirror shall correspond with the line of sight. The silver plate must be removed from the frame F, and a plate of transparent glass substituted for it, which must be so inclined that the light falling upon it shall be reflected at the polarising-angle perpendicularly towards the horizontal mirror. The eye will receive the polarised ray reflected from the mirror, and the polarised ray will have passed, before it reaches the eye, twice through a crystallised plate placed between the mirror and the polariser. The result is the same as if, in the ordinary apparatus, the polarised plate had passed through a plate of double the thickness.

Fig. 2 shows the addition to the apparatus when the coloured rings of crystals are to be examined by light circularly or elliptically polarised; *a* is the optical tube containing the lenses, which require no particular explanation, and *b* the condenser over which the plate is to be placed.

C. WHEATSTONE

SCIENTIFIC SERIALS

IN the *Journal of Botany* for April, Mr. Hiern concludes his exhaustive paper On the Forms and Distribution over the World of the Batrachian Section of *Ranunculus*; Mr. J. G. Baker his Monograph of the Liliaceous genus *Xiphion*; and we have also the conclusion of the valuable List of New Species of Phanerogamous plants published in Great Britain during the year 1870. Mr. Hiern's paper concludes with a mathematical statement of the form of the leaf of water-plants dependent on the strength of the current. Mr. Carruthers reviews the Contributions to Fossil Botany published in Britain in 1870, which are very few in number.

IN the *Scottish Naturalist* for April, Dr. Lauder Lindsay commences his second paper on Natural Science Chairs in our Universities, and the editor, Dr. Buchanan White, concludes his details of "Sugaring, how, when, and where to do it." Under the head of zoology, Dr. D. Sharp gives an interesting account of the Coleoptera of the Scotch Fir, and Mr. Robert Gray a history of the Capercaillie. The contributions to phytology are a short paper on Scottish plant-names; and a List of Mosses found in the vicinity of Forres, by the Rev. James Keith. Some of the shorter paragraphs contain also interesting information. We would suggest to the conductors of the *Naturalist* whether it is not possible to avoid the very objectionable practice of dividing their papers in the very middle of a sentence. The present number commences ". . . . waist." in the midst of the Editor's article on Sugaring, and concludes "Knowledge is likely to . . . ." in Dr. Lauder Lindsay's on the University Chairs. It is too great a stretch on the memory to expect an incomplete sentence to be kept in the head for three months; and the previous number is not always at hand to remind one of the connection.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 20.—"Research on a New Group of Colloid Bodies, containing Mercury, and certain members of the series of Fatty Ketones." By J. Emerson Reynolds, M.R.C.P. Edin., &c.

"On the Existence and Formation of Salts of Nitrous Oxide." By Edward Divers, M.D.

Geologists' Association, April 10.*—A numerous party of the members of the Geologists' Association visited Cambridge for the purpose of inspecting the Woodwardian Museum and the exposures of Cretaceous strata in the neighbourhood. On arriving at Cambridge the party proceeded at once to the Woodwardian Museum, where they were met by the Rev. Dr. Cookson, Master of St. Peter's College, the Rev. J. Wiltshire, M.A., President of the Association, Prof. Morris, the Rev. T. G. Bonney, Fellow and Tutor of St. John s College, the Rey. Osmond Fisher, M.A., and Rev. Harry Seeley, F.G.S., as the representative of the venerable Prof. Sedgwick, who, much to his regret, was prevented being present. The fine collection of fossil mollusca was ably described by the Rev. T. G. Bonney, and the reptilian remains formed the subject of an interesting discourse by Rev. H. Seeley; after which Prof. Morris, in the Geological Lecture Theatre, delivered an address on the geology of the country around Cambridge, which was listened to with great interest by a large audience, who passed a very cordial vote of thanks to the Professor for his lecture. The afternoon was devoted to a visit to the "coprolite workings" and other excavations at Barnwell. Proceeding along the banks of the Cam a fine section of Pleistocene deposits yielding mammaliferous remains and the usual species of mollusca was reached. This exposure exhibited some very fine examples of false bedding, and many granite and other boulders from the drift were here seen. A very extensive excavation in the Gault here capped by a thin deposit of Upper Greensand lower chalk was next visited. The Gault, excavated for brick making purposes, is exposed to a depth of seventy or eighty feet, and from the evidence of well-sinkers it is probably from 150 to 200 feet thick. Fossils are rarely met with in the Gault clay at this place, though in other localities this formation is very fossiliferous. Lying on the Gault at its junction with the Upper Greensand beds before mentioned occurs the stratum containing the phosphatic nodules or "Coprolites" for which this locality is famous, and which, from another locality, were first noticed as being valuable for agricultural purposes by Prof. Henslow. At a short distance from this excavation the coprolite workings are found on all sides. Indeed, the whole of the land in the neighbourhood is being systematically explored for these valuable nodules which lie at an average of six or seven feet from the surface. One field after another is taken in hand, the coprolite bed of about twelve inches in thickness is taken out, the soil is carefully replaced on the surface, and the field is once again ready for tillage. The "coprolites" are washed by horse power to remove the sand and loam in which they are imbedded, and they are then ready for conversion into manure. A considerable number of fossils, chiefly Brachiopods, were obtained. The party returned to Cambridge, and in the evening were most hospitably entertained at St. John's College by the Rev. T. G. Bonney. On the following day Upware, between Cambridge and Ely, was visited. At this place, situated in the fens and near to the river Cam, very interesting sections have been exposed in consequence of the search for "coprolites." The Gault, which has become very thin, has been cut through and Lower Greensand strata reached. In the Lower Greensand, as at the top of the Gault, a bed abounding in the so-called coprolites is found, and this bed contains characteristic Lower Greensand fossils, together with several new species of Brachiopods described by Rev. J. F. Walker, B.A., F.G.S. Cropping out within a very short distance of this exposure of Gault and Lower Greensand is a remarkable calcareous rock full of corals, which has hitherto been called Coral Rag, but which Rev. Harry Seeley, who has paid great attention to the strata of this district considers to be of Kimmeridgian age, and to which he has applied the name Upware Limestone. This rock is underlain by "Ampthill clay," which would appear to be in this district the equivalent of the Coral Rag of Oxfordshire, Gloucestershire, Dorsetshire, &c. The Brachiopods in the Lower Greensand coprolitic bed are abundant, especially *Terebratula sella*, *Terebratula prælonga*, and *Waldheimia* (*Terebratula*) *Davidsoni*. The next excursion of the Association will be to Belvedere and Erith on Saturday next, and during May visits will be paid to Oxford, Grays in Essex, and Yeovil in Somersetshire.

Anthropological Institute, April 17.—Sir John Lubbock, Bart., president, in the chair. Messrs. Marsden Gibson, Adam Murray, Charles Rooke, and Thomas Davey, were elected members. Mr. F. G. H. Price exhibited a pick made from the antlers of the red deer. Mr. Charlesworth exhibited an ancient Mexican flake of obsidian, an obsidian core, and a Mexican mirror of iron pyrites.—A paper by Dr. W. H. J. Bleek was read on the position of the Australian Languages. After pointing out the discovery, made by Sir George Grey, that the languages spoken throughout the southern portion of the Australian Continent were derived from one common stock, the author proceeded to inquire what relationship they bore to other languages. It was shown that in structure they were diametrically opposed to Polynesian languages; that they had remarkable resemblances to the Drâvidian or South-Indian languages, and should be placed with the latter in the same class. The author gave a comprehensive sketch of the characteristics of the Turanean languages, their modifications and varieties. From the linguistic point of view Dr. Bleek had arrived at the conclusion that the Australian native was, probably, mainly a degenerate offspring of the South-Indian race, and it was possible that the latter might have some admixture of negro blood, although their physical features would not altogether bear out that conclusion. It was not improbable that some portion of the negro race occupied the tropical districts of India. It would appear from a comparison of the religious customs and observances of the past with those of the present time among the Australian aborigines that those people had fallen from a higher civilisation; and that conclusion would seem to be borne out by a consideration of the artificial nature of their weapons, their knowledge of the art of spinning, the peculiar system of castes existing among them, and from other circumstances tending to confirm that view. It was not too much to say that their having been spread in small numbers over a vast continent produced almost necessarily with them, as with many European settlers in new countries, the loss of many of those acquirements of civilisation which they had original possessed.—The Rev. G. Taplin contributed "A comparative table of the Australian languages."—Mr. C. S. Wake read a paper on the mental characteristics of primitive man, as exhibited in the Aborigines of Australia. With reference to the subject of religion the author maintained that as the aborigines could not be said to have any worship at all the argument that they had been derived from inhabitants of the temperate zone was not of any value. That the Australian aborigines did possess certain points of affinity with other races was, in his mind, unquestionable. Those points of affinity, however, did not prove that the Australians had fallen from a higher state of civilisation, or that as a race they had been derived either from Southern India or from Northern Asia. A race, whatever degradation it might undergo, could never lose all trace in its social condition of that which it once possessed, and sink back to the exact state in which it must have been when it first emerged from a condition of barbarism.

Mathematical Society, April 13.—Mr. W. Spottiswoode, F.R.S., president, in the chair. Mr. C. J. Monro, B.A., late Fellow of Trinity College, Cambridge, was proposed for election, and the following gentlemen were elected members:—The Hon. J. W. Strutt, Major Frederick Close, R.A., and Mr. James Stuart, Fellow and Tutor of Trinity College, Cambridge. —The President briefly alluded to the loss the society had recently experienced by the death of its first President, the late Prof. De Morgan. Dr. Hirst, who had been intimately associated with Mr. De Morgan, when both were Professors in University College, gave a sketch of the work done by the deceased professor, especially dwelling upon the originality and acuteness displayed in all his writings, instancing, in particular, his "Double Algebra," his work on the "Differential and Integral Calculus," and his "Formal Logic." The speaker also dwelt upon the warm interest he had taken in the society from its first establishment, which led him to accept the office of first President, and to deliver the inaugural address, and then proceeded to pay a cordial tribute to his personal character. In conclusion, Dr. Hirst stated that Mr. De Morgan's valuable and unique collection of curious works bearing upon the "History of Mathematics," greatly enriched by the owner's own numerous and characteristic quotations, was, he believed, to be disposed of. Several members present expressed their wish that the collection might not be dispersed, but be secured in its entirety for the London University or for the British Museum.—Prof. Crofton, F.R.S., then explained his diagrams in illustration of the "Stresses in Warren and Lattice Girders." Prof. Henrici and Mr. Merrifield, in their remarks on the communication, drew attention to the fact that Mr. Crofton had been anticipated in his constructions in a work by K. Culmann, "Die Graptische

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* Communicated by Prof. Morris.

Statik" (1866), who had not only treated this particular matter in a freer manner, but applied his methods to a much wider range of subject. Prof. Henrici further illustrated the subject of the communication by a very simple and ingenious construction.—Prof. Cayley, V.P., followed with a brief sketch of the contents of his third memoir on "Quartic Surfaces."

Institution of Civil Engineers, April 18.—Mr. Charles B. Vignoles, F.R.S., president, in the chair.—"On the Archimedean Screw Propeller, or Helix, of Maximum Work," by Sir F. C. Knowles, Bart. In considering the construction and action of the Griffiths' Screw Propeller, the author of this memoir was struck by the fact that the blades worked in great part in the lateral streams of the water, and had no action in the dead water behind the sternpost, where power applied ought to be the most efficient. Again, in the common screw propeller at all points near the axis, the power was almost wholly employed in churning the water, and in producing vibration by alternately lifting and depressing the stem, which no doubt induced Mr. Griffiths to limit the extent of his blades to points without that space. These considerations led to an endeavour to devise some form of blade which should be free from that imperfection, and yet on the whole possess the feathering property of the Griffiths' screw. But no particular form presenting itself which on principle could be pronounced preferable to any other form, the author decided upon proceeding to an *a priori* solution of the question, and assuming the existence of some best form, he was ultimately led to propose this problem: "What is the form of the surface of the screw propeller of which the 'work done' is the greatest possible?" The complete solution of this problem was the subject of the paper, and the following was an outline of the methods employed, and of the results obtained. Referring the required surface to three rectangular co-ordinates x, y, and z, one in the axis of rotation, the other two in the plane of rotation, the author first obtained a general expression for the total "work done" by the blade in propelling the ship, in the form of a double integral in terms of the co-ordinates x and y and of the partial differentials of z with respect to each of them, of the speed of rotation of the blade, and lastly of the speed of the ship. As this integral was to be a maximum for all points of the surface sought, it must be treated by the known methods of the Calculus of Variations. This done, an equation of condition was obtained, which, by the performance of the operations indicated by the symbols, led to an equation involving two factors, each factor being a partial differential equation between the three co-ordinates of the surface. The first of these being integrated gave for its solution the whole family of ordinary helices which were the surfaces of *least* work. The second factor was the differential equation of the required surface, the treatment of which was given in the paper *in extenso*. It led at once, and very simply, to an equation analogous to that of the common helix $\left(\tan.\ \theta = \frac{a \tan.\ a}{r}\right)$ namely, $\tan.\ ^2\theta = \frac{a \tan.\ 2a}{r}$ From this it was at once deducible, that the surface of the blade at the axis cut the plane of rotation at an angle of 45°, while the common helix cut it at 90°, and therefore acted powerfully in the dead water to propel the ship, just where the common helix had no propulsive power. It was proposed to call this surface the hemi-helix, or hemi-angular helix.—The paper then proceeded to determine the pressure of this blade upon the vessel in the direction of the keel, and thence the whole circumstances of the ship's motion. It was found that there was what was called "a slip," as in the case of the common helix. The author objected to this term, as involving a fallacious theory of the action of the screw,—in effect a denial of the equality of action and reaction. In order fully to expose the fallacy, the motion of a ship impelled by the common helix as a case of variable motion in a resisting medium was investigated, and, from the identity of the conditions and of their algebraical expressions it was proved that what was called "slip" of the screw was neither more nor less than "the ratio of the difference between the velocity which the ship would have in a non-resisting medium and its actual terminal velocity in the water to the former velocity." It was proposed, therefore, to substitute for this objectionable expression the term "ratio of resistance," or "relative resistance," as accurately representing the real phenomena, and measuring the efficiency of the given screw in propelling the given vessel. The author was thus further enabled to explain what had been called "negative slip," and to assign its origin to the joint action of wind and steam, it being impossible in the case of steam alone. In the course of the discussion, objection was taken to the fundamental principles enunciated in the paper; although those principles used to be almost universally promulgated in mathematical treatises of reputed authority, and were commonly even now relied on as the basis of mathematical reasoning, by those whose investigations and experimental researches had not obliged them to detect their unsatisfactory character. Reference was made, in the first place, to what might be called the very foundation of the author's deductive process,—the proposition that when a plane moved obliquely through a fluid at a given velocity, the normal pressure on its surface was as the square of the sine of the angle of obliquity. In the second place, to the hypothesis that when the true law of pressure on a plane thus moving had been in any way determined, the local pressure on each unit of surface of a curved surface moving through a fluid could also be determined, by applying that law to the unit in virtue of the angle presented by its tangent plane to the line of motion. And thirdly to what appeared to be a misconception of the dynamical relations, or inherent conditions of the slip of the propeller.

Zoological Society, April 18.—Dr. E. Hamilton in the chair. The Secretary read a report on the additions that had been made to the society's collection during the month of March, 1871. Amongst these particular attention was called to a young male specimen of the Cape hunting dog (*Lycaon pictus*), a species which had been deficient to the society's collection since 1855.—Mr. H. E. Dresser exhibited a specimen of the American yellow-billed cuckoo (*Coccyzus americanus*), recently killed in England, and Sir Victor Brooke a specimen of the Esquimaux curlew (*Numenius borealis*), lately killed in Ireland.—Prof. Owen, F.R.S., read a paper on the dodo (*Didus ineptus*), containing notes on an articulated skeleton of this extinct bird, recently prepared from bones exhumed by Mr. Clark in the Mauritius, and now exhibited in the Ornithological Gallery of the British Museum.—A paper was read by Mr. Thomas Davidson, F.R.S. (communicated by Mr. J. Gwyn Jeffreys), containing a revised account of the recent Brachiopoda dredged by Mr. Arthur Adams in the Japanese Seas.—Messrs. Sharpe and Dresser pointed out the characters of a new form of long-tailed titmouse, which occurs in Southern Spain and in Italy, and which they proposed to call *Acredula irbii*.—Mr. R. B. Sharpe read the second part of his "Contributions to the Ornithology of Madagascar," in which was given an account of a collection of birds recently made by Mr. Crossley in that island. Among these were a specimen of a new swift proposed to be called *Cypselus gracilis*.—A communication was read from Dr. A. Günther, F.R.S., containing the description of a new form of percoid fishes from the Macquarie River, Australia, which he proposed to call *Ctenolates macquariensis*.—A communication was read from Dr. James C. Cox, containing descriptions of some new species of land and marine shells, from Australia and the Southern Pacific.—Two communications were read from Mr. J. Brazier. The first contained descriptions of some new land-shells from New South Wales—the second notes on some species of shells recently described by other authors from the Australian region.

Chemical Society, April 20.—Prof. Odling, F.R.S., vice-president, in the chair. The following gentlemen were elected fellows: C. C. Grundy, J. B. Lee, G. Sutcliffe, W. Ward. Mr. C. Haughton Gill read a paper on some saline compounds of cane sugar. The author having succeeded in obtaining a crystalline compound of sodic chloride with cane sugar, mixed a number of sugar solutions with different salts and set them to crystallise spontaneously, or when no crystals were obtained by these means a more rapid evaporation was tried. The salts employed were the chlorides of potassium, sodium, lithium, and ammonium; the bromides of potassium and sodium, and the iodides of potassium, sodium, lithium, and ammonium. None of the potassium salts gave compounds of a definite composition. The sodium salts gave much better results; there were two varieties of sodic chloride compounds formed, constituted respectively $2\ (C_{12}H_{22}O_{11})\ .\ 3\ Na\,Cl\ .\ 4\ H_2O$ and $C_{12}H_{22}O_{11}\ .\ Na\,Cl\ .\ 2\ H_2O$; the solutions containing sodic bromide gave crystals of the composition $C_{12}H_{22}O_{11}\ .\ Na\,Br\ .\ 1\frac{1}{2}\ H_2O$, they were probably not quite pure; the sodic iodide combination, $2\ (C_{12}H_{22}O_{11})\ .\ 3\ NaI\ .\ 3\ H_2O$, formed very fine crystals. The mixture containing lithium gave only crystals of pure cane sugar. The constitution of the sodic iodide compound makes it seem probable that the true molecular weight of cane sugar should be represented by $C_{24}H_{44}O_{22}$. The measurements of the crystals mentioned in Mr. Gill's paper were executed by Prof. Miller

Paris

Academy of Sciences, April 3.—The account of this sitting is printed in the *Journal Officiel*, the first time since the beginning of the investment of Paris. The account was signed and written by M. Henry de Parville.—M. Simon Newcomb was present at the sitting, and read a communication on the perturbations in the motion of the moon, owing to the attraction of the different planets. The American astronomer proposes to solve this great question, by a new method. The problem is to be solved by one hundred and fifty different equations! M. Newcomb admits it is quite impossible to solve it, without some startling simplification. The present communication is to show the Institute the way through which the author hopes to realise these 'simplifications. It is not the final work, which, if it is successful, will prove M. Newcomb has made a great analytical discovery. But in such a matter *experience passe science*. M. Delaunay offered no remark on the subject, although he has devoted to it the greater part of his life. He remains on the defensive. — M. Robin, the celebrated microscopist, handed a note on the analysis of blood taken from a man attacked by scurvy. The author shows, from observations made at Necker and Gros Caillou Hospitals, that under these circumstances many white globules are mixed in the blood. But leucocithemic having been observed in other affections, it cannot be considered as a specific character of that dangerous affection so common in besieged towns, and which was frequently observed in Paris towards the end of 1870.

The candidates for the great prize for curing cholera are not easily frightened by the civil war. The premium of 4,000*l*., given by the late M. Breaut, is worth incurring any risk. A M. Drouet sends a note giving the true cure. The process is simple enough. It is sufficient to cover the stomach of the patient with the film of a collodion, prepared by a mixture of ordinary collodion and castor oil. This collodion film is a specific against hysterical fits, typhoid fever, &c. It must be admitted that the total stopping of all perspiration may be considered as being of some help in different affections. The process may be considered as worth a trial at least, under some peculiar circumstances.—It was stated that the Institute will not interrupt its sittings at any price. If there remains only a single member, that member will sit in order to keep a regular register of communications addressed to the learned company. It is the only means for securing intellectual prosperity of scientific discoveries, and it cannot be stopped even by Communalists. We have no news of the sitting of the 10th.

BOOKS RECEIVED

English.—The Illustrated History of British Butterflies: E. Newman (W. Tweedie).—Select Methods of Chemical Analysis: W. Crookes (Longmans).

American.—Medical and Surgical Electricity: G. M. Beard and A. D. Rockwell (New York, W. Wood and Co.).

Foreign.—(Through Williams and Norgate)—Die Anwendung des Spectral-apparatus: K. Vierordt.

PAMPHLETS RECEIVED

English.—On the Gibraltar Currents, the Gulf Stream, and the General Oceanic Circulation: Dr. W. B. Carpenter.—Preparatory Programme of the National University for Industrial and Technical Training, and Report of Provisional Committee.—Transactions of the Scottish Arboricultural Society, Vol. vi., part 1.—The Iron and Steel Institute: Address of the President, Mr. H. Bessemer.—The Sicilian Eclipse Expedition: Lecture by Dr. T. E. Thorpe.—Barometer, Manual, Board of Trade: R. H. Scott.—Annual Report of the Manchester Scientific Students' Association for 1870.—Protest against Mr. J. H. Walshs Decision in the Bedford Level Survey: W. Carpenter.—Gas, its high Price in the Metropolis, and the Way to Reduce it: C. G. Cleminshaw.—Explanatory Memoir to accompany sheets 86, 87, 88, and eastern part of 85 of the maps of the Geological Survey of Ireland: G. H. Kinahan and R G. Symes.—Common Salt, a Remedy against Small-ox.—On the Uniform Flow of a Liquid: Canon Moseley.—On the Mean Thickness of the Sedimentary Rocks of the Globe: James Croll.—The Proceedings of the Cotteswold Naturalists' Field Club for 1869.—On the Post Glacial Deposits of Western Lancashire and Cheshire: C. E. de Rance.—On the Glacial Phenomena of Western Lancashire and Cheshire: C. E. de Rance.—A Lecture on Vegetarianism: Prof. F. W. Newman.—Science Lectures for the People delivered at Hulme Town Hall, second series.

American and Colonial.—The Principles of Pure Crystallography: G. Hinrichs.—The Great Pyramid of Jizeh; the Plan and Objects of its Construction.—Monthly Report of the Department of Agriculture for January 1871.—Second Annual Report of the State Board of Health of Massachusetts.—Preliminary Sketch of a Natural Arrangement of the Order Docoglossa: W. H. Dall.—Reports of the Mining Surveyors and Registrars, Victoria, for the quarter ending Dec. 31, 1870.—Digest of the return of all the Deaths from Phthisis in Melbourne and suburbs during 1865-69 and the first half of 1870: W. Thompson —Government Telegrams and Reports for the benefit of Commerce (Washington).—On the Physical Conditions of a closed Circuit contiguous to a permanent and constant Voltaic Current: A. M. Mayer.—Observations on the Variations of the Magnetic Declination in Connection with the Aurora of October 14, 1870: A. M. Mayer.—On the Temperature and Physical Constitution of the Sun: (from the Journal of the Franklin Institute) Prof. Zöllner.—G. W. Childs: a Biographical Sketch, by James Parton.

Foreign.—Die Tangentialwage und ihre Anwendung zur Bestimmung der Dichte fester u. flüssiger Körper mittelst directer Ablesung: K. W. Zenger.—Ueber die Steinsalzablagerung bei Stassfurt: C. Reinwarth.—Zur Erinnerung au Wilhelm Haidinger: F. Ritter v. Hauer.

DIARY

THURSDAY, April 27.

Royal Society, at 8.30.—On the Increase of Electrical Resistance in Conductors with Rise of Temperature, and its application to the measure of Ordinary and Furnace Temperatures; also on a simple Method of Measuring Electrical Resistances: C. W. Siemens, F R.S.
London Institution, at 7.30.—On Economic Botany: Prof. Bentley.
Royal Institution, at 3.—On Sound: Prof. Tyndall.

FRIDAY, April 28.

Quekett Microscopical Club, at 8.
Royal Institution. at 9.—On the revived Theory of Phlogiston: Prof. Odling, F.R.S.

SATURDAY, April 29.

Royal School of Mines, at 8.—Geology: Dr. Cobbold.
Zoological Society, at 1.—Anniversary Meeting.
Royal Institution, at 3.—On the Instruments Used in Modern Astronomy: J. N. Lockyer, F.R.S.

MONDAY, May 1.

Entomological Society, at 7.
Royal Institution, at 2.—Annual Meeting.
London Institution, at 4.—On Astronomy: R. A. Procter, F.R.A.S. (Educational Course.)

TUESDAY, May 2.

Zoological Society, at 9.—On the Birds of the Island of Celebes: Viscount Walden.—On Speke's Antelope and the allied species of the genus *Tragelaphus*: Sir V. Brooke, Bart.
Society of Biblical Archæology.—On a Hieroglyphic Tablet of Alexander, son of Alexander the Great, recently discovered at Cairo: S. Birch, LL.D., F.S.A.—Some notice of three new bronze Himgaritic Tablets.
Royal Institution, at 3.—On the Geology of Devonshire, especially of the New Red Sandstone System: William Pengelly, F.R.S.

WEDNESDAY, May 3.

Royal Microscopical Society, at 8.—On the Structure of Lepidopterous Scales as bearing on the Structure of Lepidocyrtus curvicollis: Dr. Maddox.—On the Foot of Dityscus marginalis: B. T. Lowne.
Society of Arts, at 8.—On the Production of Artificial Cold: Prof. J. Gamgee.

THURSDAY, May 4.

Royal Society, at 8.30.
Society of Antiquaries, at 8.30.
Linnean Society, at 8.—The phenomena of Protective Mimicry, and its bearing on the Theory of Natural Selection as illustrated by the Lepidoptera of the British Islands: Raphael Meldola, F.C.S.
Chemical Society, at 8.—On the Productive Powers of Soils in relation to the Loss of Plant Food by Drainage: Dr. Voelcker, F.R.S.
Royal Institution, at 3.—On Sound: Prof. Tyndall.

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